NOTES ON THE NORTH AMERICAN SPECIES OF SUCCINEA.

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[*Concluded from Vol. VI, p.* 31.]

(18.) *S. luteola* Gould. Mr. Singley sent me this from Manatee Co., Florida, and at the same time specimens marked *texasiana* Pfr., from Derby, Frio Co., Texas. I made notes on these shells as follows:

(a.) *S. texasiana.* Belongs perhaps to *putris* group, but very different from it, and forming a new subsection. Shell shaped, but for mouth, like some varieties of *Limnæa palustris.* Length 16½ mill. Transversely irregularly striate-ribbed. Young example semitransparent pale horn, adults opaque yellowish-white.

(b.) *S. luteola.* No doubt the same species as *texasiana*, but the specimens are horn-color and smaller; some little ones are more like *putris*—7½ mill. long, shiny, striate, horn-color, more globose, spire short.

Sect. III. *Lucenæ.*

=*Lucena* Oken.

(19.) *S. avara* Say. This species varies in color a good deal, and also in shape. The following are the varieties described or known to me.

(a.) forma *alba* nov. Shell greenish-white. Horseshoe Bend Gulch, Custer Co., Colorado, at about 10,000 ft. alt. Mr. H. Prime has an albino of *S. avara* from Arizona, and there is a specimen in the Binney and Bland collection from New York State (Dr. Lewis.)

(b.) forma *wardiana* Lea. Shell yellow.

(c.) var. *vermeta* Say. Yellowish, thin, suture deep. I have seen a clear red-brown form of this from Toronto, Canada (D. B. Cockerell). An amber-colored form was sent to me by Mr. Binney, collected by Mr. W. S. Teator at Barrytown, Duchess Co., N. Y.—this may also fall under *vermeta.*

(d.) var. *compacta* Ckll. J. of Conch., 1892, p. 39. Colorado.

(e.) forma *major* W. G. Binney, Ac. Nat. Sci. Phila., Nov., 1858, sine descr. A large variety, about 13½ mill. long, in the Binney and Bland collection, is from Utica, N. Y. It is marked var. *major*, apparently in Mr. Binney's handwriting.

(20.) *S. aurea* Lea. I formerly supposed this might be closely allied to *pfeifferi;* having received a close relative or variety of that species from St. Thomas, Ontario, Canada (D. B. Cockerell), which seemed to agree with *aurea.* This view, however, was probably erroneous, as a specimen marked *aurea* in the Binney and Bland collection seems to belong to the *avara* section.

(21.) *S. mooresiana* Lea. I have found shells in a dry locality on Round Mountain, Custer Co., Colo., which, although no doubt referable to a variety of *avara,* appear to be Lea's *mooresiana.* A specimen of *mooresiana* in the Binney and Bland collection, from the Platte River, also seems to belong to *S. avara.*

(22.) *S. oregonensis* Lea. Mr. Singley sent me this from Dalles, Oregon, (E. H. White). I noted that they were of the *avara* group, but in shape approaching the *pfeifferi* group, pale reddish-horn, striate, dull. One in the Binney and Bland collection looks like a member of the *pfeifferi* group, but another, marked with a query, is larger and seems to belong to the *avara* section.

(23.) *S. rusticana* Gould. Mr. Singley sent me some shells labelled *oregonensis* from Plumas Co., California (G. W. Michael), of which I noted: *avara* group, larger than *oregonensis* from The Dalles, greenish-horn, more shiny, whorls more convex. These specimens seemed to agree better with *rusticana* than *oregonensis.* Later, Mr. Binney has sent me a shell, apparently *rusticana,* found by Mr. Hemphill at Julian City, San Diego Co., California. This shell is 10¾ mill. long, form of *rusticana,* but aperture more oblique, color reddish-horn, rather shiny; soft parts (in alcohol) black. It is impossible to tell whether

these shells should be separated from *rusticana* without examining a larger series showing the variation.

(24.) *S. verrilli* Bld. Apparently belongs to sect. *Lucenæ*, but I have not seen specimens.

(25.) *S. grœnlandica* Beck. Specimens in the Binney and Bland collection from Kuksuk, Greenland, almost certainly belong to this group; although the species seems to have leaning toward the *Campestres*, with which it allies itself through *S. chrysis* and *S. annexa*.

Section IV. *Campestres.*

(26.) *S. campestris* Say. Mr. Singley sent me specimens of this from Long Key, Florida; they seemed to me nearly identical with *S. lineata* from Kremmling, Colo. A variety of *campestris* was named *inflata* by Lea.

(27.) *S. lineata* W. G. Binney. Found in rejectamenta at Kremmling, Colo., together with a form *elongata*, Ckll., J. of Conch., 1892, p. 39.

(28.) *S. greerii* Tryon. This is considered a synonym of *S. obliqua*, but a dead shell in the Binney and Bland collection from Vicksburg, Miss. (Tryon), appeared to resemble *campestris*.

(29.) *S. chrysis* Westerl.

(30.) *S. annexa* Westerl. This and the last appear to belong here, but are probably related somewhat to *grœnlandica*. The presence of whitish streaks on the arctic species is noteworthy. Dr. von Martens (Conch. Mittheilungen, 1885) has described a var. *aurelia* of *S. chrysis* from Alaska.

(31.) *S. unicolor* Tryon. A specimen so named is in the Binney and Bland collection from New Orleans, La. It is a peculiar shell, apparently of sect. *Campestres*, very globose, spire short and blunt.

(32.) *S. turgida* Westerl. This species is unknown to me; it is recorded in Land– och Sötv. Moll. Vega–Exped. 1885.

(33.) *S. decampii* Tyron. Belongs to *Amphibinæ*, and was accidently omitted in the proper place. It is considered a form of *ovalis*, but a specimen from Michigan (Tryon), in the

Binney and Bland collection seemed hardly quite like *ovalis;* small, shiny, thin, rather greenish.

Of these 33 nominal species of *Succinea*, possibly not more than about half will prove valid, but it is impossible to arrive at any exact results without further research into the variation, anatomy and distribution of the several forms.

The distribution, so far as known, present some features of interest. The species of the eastern and northern states are more like those of Europe than the southern or western. The southern and northwestern distribution of the *campestres* is noteworthy. It appears that in glacial times, owing to a warm current, the coast of Alaska was free from ice, while that of British Columbia was glaciated down to the sea[1]; hence a contingent of the *campestres* may have survived to the north, while their representatives in some of the middle regions were exterminated.

While on the subject of *Succinea*, it may be worth while to call attention to fig. 13 of pl. II, Bull, U. S. Geol. Survey, No. 34, (1886). The fossil there figured is referred by Dr. C. A. White with doubt to *Limnœa*, but is it not a *Succinea* of the section *Lucenæ?*

Regarding the Calif. *Succ. stretchiana* (Naut. VI, p. 72), I fear the specimens were in a box which unfortunately got lost in the post on its way back to Mr. Singley. They *seemed* to represent a distinct form, but it is possible that they were not true *stretchiana*. Bland's type was from Washoe Co., Nevada; and no doubt the specimen from that locality in the Binney and Bland collection belonged to the original lot, the actual type being in U. S. N. M. (see Man. Amer. Land Shells, p. 497). The Washoe Co. specimen examined by me was in some respects like *avara*, and by no means altogether like the Californian examples; but considering the variation seen in species of *Succinea*, I did not feel able to decide without better material, whether they should be held distinct, and so accepted the indication of the labels. There is a Colorado *Succinea* which was formerly thought to be *stretchiana*, but it is certainly either a var. of *avara* or a species very closely allied. Is anyone prepared to say exactly what distinguishes *stretchiana* from other species? If the San Francisco specimens were not *stretchiana*, I am rather puzzled to know what are the true characters of the species. Perhaps the anatomy would settle the question.

[1]See Prestwich, Geology (1888) Vol. II, p. 464.